

DRINKING WATER SURVEILLANCE PROGRAM

CHATHAM
WATER TREATMENT
PLANT

ANNUAL REPORT 1990



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**CHATHAM
WATER TREATMENT PLANT**

DRINKING WATER SURVEILLANCE PROGRAM

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

CHATHAM WATER TREATMENT PLANT 1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Chatham water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, taste and odour control and disinfection. This plant has a design capacity of $91.0 \times 1000 \text{ m}^3/\text{day}$. The Chatham water treatment plant serves a population of approximately 42,000.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Chatham water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A ' ' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE		RAW		TREATED		SITE 1		SITE 2	
	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE	TESTS	POSITIVE
BACTERIOLOGICAL	33	6	18	12	1	8	11	3	27	9
CHEMISTRY (FLD)	72	72	100	72	72	100	112	112	100	84
CHEMISTRY (LAB)	264	217	82	264	195	73	361	317	87	266
METALS	288	113	39	288	95	32	437	201	45	299
CHLORODROMATICS	154	0	0	154	0	0	126	0	0	126
CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0
PAH	184	0	0	201	0	0	17	0	0	0
PESTICIDES & PCB	389	0	0	389	0	0	192	1	0	191
PHENOLICS	12	2	16	12	1	8	0	0	0	0
SPECIFIC PESTICIDES	62	0	0	62	0	0	9	0	0	9
VOLATILES	348	44	12	348	49	14	319	45	14	232
TOTAL	1818	454	1814	1814	413	1584	679	1216	474	1216

DRINKING WATER SURVEILLANCE PROGRAM

CHATHAM WATER TREATMENT PLANT 1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Chatham water treatment plant in December 1988. A previous annual report was published for 1989.

PLANT DESCRIPTION

The Chatham water treatment plant is a conventional treatment plant which treats water from Lake Erie. Raw water is chlorinated at the lowlift pumping station and is then pumped 9 kilometres to the water treatment plant in Chatham. The process consists of coagulation, flocculation, sedimentation, filtration, taste and odour control and disinfection. This plant has a design capacity of $91.000 \times 1000 \text{ m}^3/\text{day}$. The Chatham water treatment plant serves a population of approximately 42,000.

The sample day flows ranged from $20.2 \times 1000 \text{ m}^3/\text{day}$ to $33.7 \times 1000 \text{ m}^3/\text{day}$.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Raw water (chlorinated at the Lake Erie pumping station), treated water at the plant, and water at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- THE TREATED AND DISTRIBUTED WATER;**
- ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count, which may indicate some deterioration in water quality if the guideline of 500 counts/mL is exceeded.

Standard plate count (membrane filtration) exceeded the ODWO Maximum Desirable Concentration of 500 counts/mL in 1 of 32 treated and distributed water samples with a maximum reported value of 1,800.0 counts/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 10 of 32 treated and distributed water samples with a maximum reported value of 20.0°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in all 32 treated and distributed water samples with a maximum reported value of 135.6 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1 Formazin Turbidity Unit (FTU).

The lab turbidity exceeded the Maximum Acceptable Concentration in 6 of 12 treated water samples with a maximum reported value of 2.9 FTU but these were not confirmed by the corresponding field turbidities which were considered more reliable.

METALS

At present, there is no evidence that aluminum is physiologically harmful and no health limit for drinking water has been specified. The measure of aluminum in treated water is important to indicate the efficiency of the treatment process. The ODWOs indicate that a useful guideline is to maintain a residual below 100 ug/L as aluminum in the water leaving the plant, to avoid problems in the distribution system.

Aluminum exceeded the ODWO Aesthetic or Recommended Operational Guideline of 100 ug/L in 7 of 32 treated and distributed water samples with a maximum reported value of 140.0 ug/L.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water.

Phenolics exceeded the ODWO Aesthetic or Recommended Operational Guideline of 2.0 ug/L in 1 of 12 treated water samples with a maximum reported value of 7.8 ug/L.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

Ethylbenzene was found at positive levels in 1 of the 31 treated and distributed water samples analyzed. The concentration was 0.55 ug/L. This was below the ODWO Aesthetic Objective of 2.4 ug/L.

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

1,1,1-Trichloroethane was reported at a positive level in 1 of 31 treated and distributed water samples with a maximum reported value of 0.66 ug/L. This is below the United States Environmental Protection Agency Maximum Contaminant Level of 200 ug/L.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 31 treated and distributed water samples analyzed with a maximum level of 62.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

THMs were detected in the raw water samples taken at the plant. The raw water had been chlorinated at the lowlift pumping station at Lake Erie.

CONCLUSIONS

The Chatham water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1
CHATHAM WTP

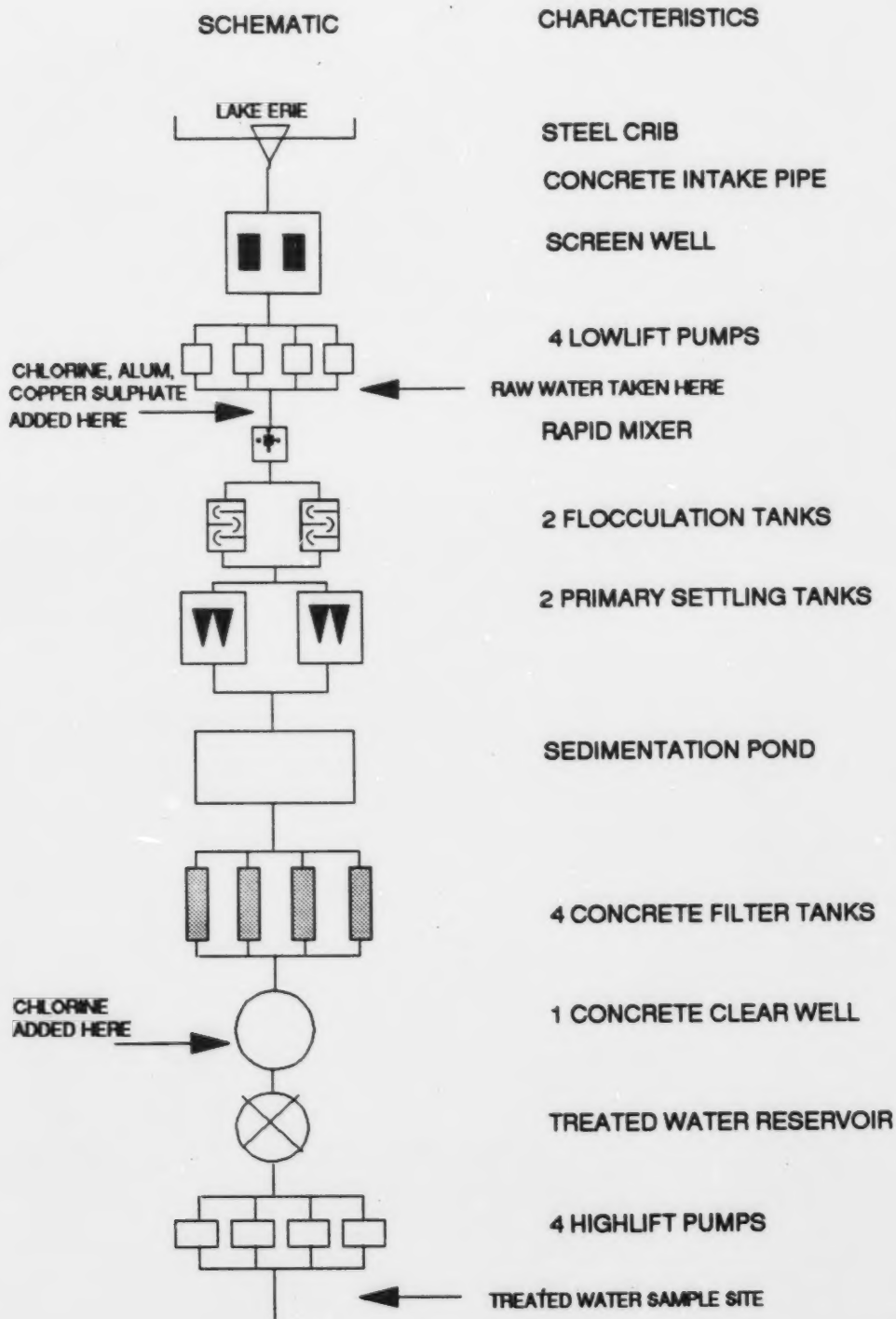


TABLE 1
DRINKING WATER SURVEILLANCE PROGRAM
PLANT GENERAL REPORT

WORKS #: 220003378
PLANT NAME: CHATHAM WTP

DISTRICT: CHATHAM
REGION: SOUTHWEST
DISTRICT OFFICER :J. DRUMMOND

UTM #: 174165654678830

PLANT SUPERINTENDENT: KEN BANKS

ADDRESS: 325 GRAND AVE EAST
CHATHAM, ONTARIO
N7L 1W9
(519-352-5840)

MUNICIPALITY: CHATHAM
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	-	(X 1000 M3)
DESIGN CAPACITY:	91.000	(X 1000 M3/DAY)
RATED CAPACITY:	-	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
-----	-----
CHATHAM	42,000

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

<u>PARAMETER</u>	<u>LOCATION</u>	<u>FREQUENCY</u>
ALUMINUM	TREATED WATER IN LAB	WEEKLY
COMBINED CHLORINE RESIDUAL	TREATED WATER IN LAB	WEEKLY
FREE CHLORINE RESIDUAL	TREATED WATER IN LAB	WEEKLY
TOTAL CHLORINE RESIDUAL	TREATED WATER IN LAB	DAILY
PH	TREATED WATER IN LAB	WEEKLY
TEMPERATURE	TREATED WATER IN LAB	DAILY
TURBIDITY	TREATED WATER IN LAB TREATED WATER	DAILY CONTINUOUS

TABLE 3
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP SAMPLE DAY CONDITIONS FOR 1990

DATE	DELAY * TIME(HRS)	FLOW (1000G3)	TREATMENT CHEMICAL DOSAGES (MG/L)		POST CHLORINATION CHLORINE
			PRE CHLORINATION	ALUM LIQUID COAGULATION	
JAN 03 19.00	21.990	1.08		6.35	.66
FEB 06 24.00	21.412	1.19		9.59	.98
MAR 06 20.00	20.280	1.20		10.08	1.03
APR 03 21.50	22.066	1.24		8.28	1.03
MAY 08 2.50	32.550	1.09		8.98	1.09
JUN 05 21.50	25.153	1.13		11.45	1.16
JUL 04 21.00	33.745	.99		8.40	1.26
AUG 08 22.00	25.003	1.12		10.60	1.20
SEP 05 20.00	28.353	.85		8.05	1.25
OCT 10 18.00	26.003	1.48		16.75	1.22
NOV 06 20.00	24.267	.97		8.50	1.16
DEC 04 20.00	23.594	1.56		14.20	1.04

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	11	0	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	12	1	0	11	3	0	9	5	0
TOTAL COLIFORM MF	11	0	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	11	6	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL												
33	6	0	12	1	0	11	3	0	9	5	0	
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	12	12	0	12	12	0	19	19	0	14	14	0
FLD CHLORINE FREE	12	12	0	12	12	0	19	19	0	14	14	0
FLD CHLORINE (TOTAL)	12	12	0	12	12	0	19	19	0	14	14	0
FLD PH	12	12	0	12	12	0	19	19	0	14	14	0
FLD TEMPERATURE	12	12	0	12	12	0	19	19	0	14	14	0
FLD TURBIDITY	12	12	0	12	12	0	17	17	0	14	14	0
*TOTAL SCAN CHEMISTRY (FLD)												
72	72	0	72	72	0	112	112	0	84	84	0	
CHEMISTRY (LAB)												
ALKALINITY	12	12	0	12	12	0	19	19	0	14	14	0
CALCIUM	12	12	0	12	12	0	19	19	0	14	14	0
CYANIDE	12	0	0	12	0	0	.	.	.	.	.	.
CHLORIDE	12	12	0	12	12	0	19	19	0	14	14	0
COLOUR	12	0	6	12	1	9	19	6	12	14	0	14
CONDUCTIVITY	12	12	0	12	12	0	19	19	0	14	14	0
DISS ORG CARBON	12	12	0	12	12	0	19	19	0	14	14	0
FLUORIDE	12	12	0	12	12	0	19	19	0	14	14	0
HARDNESS	12	12	0	12	12	0	19	19	0	14	14	0
IONCAL	12	12	0	12	12	0	19	19	0	14	14	0
LANGELIERS INDEX	12	12	0	12	12	0	19	19	0	14	14	0
MAGNESIUM	12	12	0	12	12	0	19	19	0	14	14	0
SODIUM	12	12	0	12	12	0	19	19	0	14	14	0
AMMONIUM TOTAL	12	1	2	12	0	3	19	4	6	14	0	5
NITRITE	12	4	8	12	1	4	19	3	11	14	0	11
TOTAL NITRATES	12	12	0	12	12	0	19	19	0	14	14	0
NITROGEN TOT KJELD	12	12	0	12	11	1	19	19	0	14	14	0
PH	12	12	0	12	12	0	19	19	0	14	14	0
PHOSPHORUS FIL REACT	12	8	3	12	0	5	.	.	.	.	.	.
PHOSPHORUS TOTAL	12	12	0	12	2	6	.	.	.	.	.	.
SULPHATE	12	12	0	12	12	0	19	19	0	14	14	0
TURBIDITY	12	12	0	12	12	0	19	19	0	14	14	0
*TOTAL SCAN CHEMISTRY (LAB)												
264	217	19	264	195	28	361	317	29	266	224	30	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	12	0	0	12	0	0	19	0	0	13	0	0
ALUMINUM	12	12	0	12	12	0	19	19	0	13	13	0
ARSENIC	12	1	11	12	0	9	19	0	13	13	0	10
BARIUM	12	12	0	12	12	0	19	19	0	13	13	0
BORON	12	10	2	12	10	2	19	16	3	13	10	3
BERYLLIUM	12	0	4	12	0	0	19	0	4	13	0	1
CADMIUM	12	0	2	12	0	1	19	1	6	13	0	3
COBALT	12	0	12	12	0	11	19	0	15	13	0	11
CHROMIUM	12	0	8	12	0	10	19	0	15	13	0	12
COPPER	12	1	11	12	0	12	19	17	2	13	8	5
IRON	12	9	3	12	2	10	19	14	5	13	9	4
MERCURY	12	4	5	12	1	1	19	1	1	13	1	1
MANGANESE	12	12	0	12	11	1	19	19	0	13	13	0
MOLYBDENUM	12	12	0	12	12	0	19	19	0	13	13	0
NICKEL	12	0	12	12	1	8	19	6	10	13	2	8
LEAD	12	3	9	12	3	9	19	11	8	13	5	8
ANTIMONY	12	6	6	12	4	8	19	11	8	13	10	3
SELENIUM	12	0	3	12	0	5	19	0	7	13	0	6
STRONTIUM	12	12	0	12	12	0	19	19	0	13	13	0
TITANIUM	12	7	5	12	4	8	19	7	12	13	2	11
THALLIUM	12	0	0	12	0	1	19	0	0	13	0	0
URANIUM	12	1	11	12	0	12	19	0	19	13	0	13
VANADIUM	12	4	8	12	9	3	19	4	15	13	5	8
ZINC	12	7	5	12	2	10	19	19	0	13	13	0
*TOTAL SCAN METALS	288	113	117	288	95	121	437	201	142	299	129	106
*TOTAL GROUP INORGANIC & PHYSICAL	624	402	136	624	362	149	910	630	171	649	437	136

CHLOROAROMATICS

HEXACHLOROBUTADIENE	11	0	0	11	0	0	9	0	0	9	0	0
123 TRICHLOROBENZENE	11	0	0	11	0	0	9	0	0	9	0	0
1234 T-CHLOROBENZENE	11	0	0	11	0	0	9	0	0	9	0	0
1235 T-CHLOROBENZENE	11	0	0	11	0	0	9	0	0	9	0	0
124 TRICHLOROBENZENE	11	0	0	11	0	0	9	0	0	9	0	0
1245 T-CHLOROBENZENE	11	0	0	11	0	0	9	0	0	9	0	0
135 TRICHLOROBENZENE	11	0	0	11	0	0	9	0	0	9	0	0
HCB	11	0	0	11	0	0	9	0	0	9	0	0
HEXACHLOROETHANE	11	0	0	11	0	0	9	0	0	9	0	0
OCTACHLOROSTYRENE	11	0	0	11	0	0	9	0	0	9	0	0
PENTACHLOROBENZENE	11	0	0	11	0	0	9	0	0	9	0	0
236 TRICHLOROTOLUENE	11	0	0	11	0	0	9	0	0	9	0	0
245 TRICHLOROTOLUENE	11	0	0	11	0	0	9	0	0	9	0	0
26A TRICHLOROTOLUENE	11	0	0	11	0	0	9	0	0	9	0	0
*TOTAL SCAN CHLOROAROMATICS	154	0	0	154	0	0	126	0	0	126	0	0

CHLOROPHENOLS

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE			TOTAL POSITIVE TRACE		
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0

PAH												
PHENANTHRENE	11	0	0	12	0	0	1	0	0	.	.	.
ANTHRACENE	10	0	0	11	0	0	1	0	0	.	.	.
FLUORANTHENE	11	0	0	12	0	0	1	0	0	.	.	.
PYRENE	11	0	0	12	0	0	1	0	0	.	.	.
BENZO(A)ANTHRACENE	11	0	0	12	0	0	1	0	0	.	.	.
CHRYSENE	11	0	0	12	0	0	1	0	0	.	.	.
DIMETH. BENZ(A)ANTHR	10	0	0	11	0	0	1	0	0	.	.	.
BENZO(E) PYRENE	11	0	0	12	0	0	1	0	0	.	.	.
BENZO(B) FLUORANTHENE	11	0	0	12	0	0	1	0	0	.	.	.
PERYLENE	11	0	0	12	0	0	1	0	0	.	.	.
BENZO(K) FLUORANTHENE	11	0	0	12	0	0	1	0	0	.	.	.
BENZO(A) PYRENE	10	0	0	11	0	0	1	0	0	.	.	.
BENZO(G,H,I) PERYLENE	11	0	0	12	0	0	1	0	0	.	.	.
DIBENZO(A,H) ANTHRAC	11	0	0	12	0	0	1	0	0	.	.	.
INDENO(1,2,3-C,D) PY	11	0	0	12	0	0	1	0	0	.	.	.
BENZO(B) CHRYSENE	11	0	0	12	0	0	1	0	0	.	.	.
CORONENE	11	0	0	12	0	0	1	0	0	.	.	.
*TOTAL SCAN PAH	184	0	0	201	0	0	17	0	0	0	0	0

PESTICIDES & PCB												
ALDRIN	11	0	0	11	0	0	9	0	0	9	0	0
ALPHA BHC	11	0	5	11	0	3	9	0	3	9	0	4
BETA BHC	11	0	0	11	0	0	9	0	0	9	0	0
LINDANE	11	0	0	11	0	1	9	0	0	9	0	0
ALPHA CHLORDANE	11	0	0	11	0	0	9	0	0	9	0	0
GAMMA CHLORDANE	11	0	0	11	0	0	9	0	0	9	0	0
DIELDRIN	11	0	0	11	0	0	9	0	0	9	0	0
METHOXYCHLOR	11	0	0	11	0	0	9	0	0	9	0	0
ENDOSULFAN I	11	0	0	11	0	0	9	0	0	9	0	0
ENDOSULFAN II	11	0	0	11	0	0	9	0	0	9	0	0
ENDRIN	11	0	0	11	0	0	9	0	0	9	0	0
ENDOSULFAN SULPHATE	11	0	0	11	0	0	9	0	0	9	0	0
HEPTACHLOR EPOXIDE	11	0	0	11	0	0	9	0	0	9	0	0
HEPTACHLOR	11	0	0	11	0	0	9	0	0	9	0	0
MIREX	11	0	0	11	0	0	9	0	0	9	0	0
OXYCHLORDANE	11	0	0	11	0	0	9	0	0	9	0	0
OPDDT	11	0	0	11	0	0	9	0	0	9	0	0
PCB	11	0	0	11	0	0	9	0	0	9	0	0
DDD	11	0	0	11	0	0	9	0	0	9	0	0
PPDDE	11	0	0	11	0	0	9	0	0	9	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	11	0	0	11	0	0	9	0	0	9	0	0
AMETRINE	12	0	0	12	0	0	0	0	0	.	.	.
ATRAZINE	12	0	4	12	0	3	0	0	0	.	.	.
ATRATONE	12	0	0	12	0	0	0	0	0	.	.	.
CYANAZINE (BLADEX)	12	0	0	12	0	0	0	0	0	.	.	.
DESETHYLATRAZINE	12	0	0	12	0	0	0	0	0	.	.	.
D-ETHYL SIMAZINE	11	0	0	11	0	0	0	0	0	.	.	.
PROMETONE	12	0	0	12	0	0	0	0	0	.	.	.
PROPACINE	12	0	0	12	0	0	0	0	0	.	.	.
PROMETRYNE	12	0	0	12	0	0	0	0	0	.	.	.
METRIBUZIN (SENCOR)	12	0	0	12	0	0	0	0	0	.	.	.
SIMAZINE	12	0	0	12	0	0	0	0	0	.	.	.
ALACHLOR (LASSO)	12	0	0	12	0	0	0	0	0	.	.	.
METOLACHLOR	12	0	0	12	0	0	0	0	0	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	3	0	0	3	1	0	2	0	0
*TOTAL SCAN PESTICIDES & PCB	389	0	9	389	0	7	192	1	3	191	0	4

PHENOLICS												
PHENOLICS	12	2	5	12	1	4	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	12	2	5	12	1	4	0	0	0	0	0	0

SPECIFIC PESTICIDES												
TOKAPHENE	11	0	0	11	0	0	9	0	0	9	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	2	0	0	2	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALATE	2	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	62	0	0	62	0	0	9	0	0	9	0	0
VOLATILES												
BENZENE	12	0	2	12	0	2	11	0	2	8	0	2
TOLUENE	12	0	3	12	0	5	11	0	1	8	0	1
ETHYLBENZENE	12	0	5	12	1	7	11	0	10	8	0	5
P-XYLENE	12	0	0	12	0	0	11	0	0	8	0	0
M-XYLENE	12	0	0	12	0	2	11	0	0	8	0	0
O-XYLENE	12	0	1	12	0	1	11	0	0	8	0	0
STYRENE	12	0	8	12	0	0	11	0	9	8	0	7
1,1 DICHLOROETHYLENE	12	0	0	12	0	0	11	0	0	8	0	0
METHYLENE CHLORIDE	12	0	0	12	0	0	11	0	0	8	0	0
1,1,2 DICHLOROETHYLENE	12	0	0	12	0	0	11	0	0	8	0	0
1,1 DICHLOROETHANE	12	0	0	12	0	0	11	0	0	8	0	0
CHLOROFORM	12	12	0	12	12	0	11	11	0	8	8	0
111, TRICHLOROETHANE	12	0	0	12	0	3	11	1	1	8	0	0
1,2 DICHLOROETHANE	12	0	0	12	0	0	11	0	0	8	0	0
CARBON TETRACHLORIDE	12	0	0	12	0	0	11	0	0	8	0	0
1,2 DICHLOROPROPANE	12	0	0	12	0	0	11	0	0	8	0	0
TRICHLOROETHYLENE	12	0	0	12	0	0	11	0	1	8	0	0
DICHLOROBROMOMETHANE	12	12	0	12	12	0	11	11	0	8	8	0
112 TRICHLOROETHANE	12	0	0	12	0	0	11	0	0	8	0	0
CHLORODIBROMOMETHANE	12	11	1	12	12	0	11	11	0	8	8	0
T-CHLOROETHYLENE	12	0	0	12	0	2	11	0	0	8	0	0
BROMOFORM	12	0	10	12	0	12	11	0	11	8	0	8
1122 T-CHLOROETHANE	12	0	0	12	0	0	11	0	0	8	0	0
CHLOROBENZENE	12	0	0	12	0	0	11	0	0	8	0	0
1,4 DICHLOROBENZENE	12	0	0	12	0	0	11	0	0	8	0	0
1,3 DICHLOROBENZENE	12	0	0	12	0	0	11	0	0	8	0	0
1,2 DICHLOROBENZENE	12	0	0	12	0	0	11	0	0	8	0	0
ETHYLENE DIBROMIDE	12	0	0	12	0	0	11	0	0	8	0	0
TOTL TRIHALOMETHANES	12	9	2	12	12	0	11	11	0	8	8	0
*TOTAL SCAN VOLATILES	348	44	32	348	49	34	319	45	35	232	32	23
*TOTAL GROUP ORGANIC	1161	46	46	1178	50	45	663	46	38	558	32	27

KEY TO TABLE 5 and 6

- A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3+. AO for Total Xylenes
4. Recommended Operational Guideline
- B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)
- C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV
- D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH
- F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissible Concentration (MADC)
- G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE
- I NEW YORK STATE AMBIENT WATER GUIDELINE
- N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
ICS	No Data: Contamination Suspected
IIL	No Data: Sample Incorrectly Labelled
IIS	No Data: Insufficient Sample
IIV	No Data: Inverted Septum
ILA	No Data: Laboratory Accident
ILD	No Data: Test Queued After Sample Discarded
INA	No Data: No Authorization To Perform Reanalysis
INP	No Data: No Procedure
INR	No Data: Sample Not Received
IOP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
IPE	No Data: Procedural Error - Sample Discarded
IPH	No Data: Sample pH Outside Valid Range
IRE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
ISM	No Data: Sample Missing
ISS	No Data: Send Separate Sample Properly Preserved
IUI	No Data: Indeterminant Interference
ITX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

SITE 2

STANDING

FREE FLOW

STANDING

FREE FLOW

BACTERIOLOGICAL

FECAL COLIFORM MF (CT/100ML)

DET'N LIMIT = 0

GUIDELINE = 0 (A1)

JAN	BDL	.	.	.	.	.
FEB	BDL	.	.	.	.	.
MAR	BDL	.	.	.	.	.
APR	0	.	.	.	.	.
MAY	0	.	.	.	.	.
JUN	0	.	.	.	.	.
JUL	0	.	.	.	.	.
AUG	0	.	.	.	.	.
SEP	BDL	.	.	.	.	.
NOV	BDL	.	.	.	.	.
DEC	BDL	.	.	.	.	.

STANDRD PLATE CNT MF (COUNTS/ML)

DET'N LIMIT = 0

GUIDELINE = 500/ML (A3)

JAN	.	2 <=>	.	57	.	67
FEB	.	0 <=>	.	0 <=>	.	4 <=>
MAR	.	0 <=>	.	0 <=>	.	2 <=>
APR	.	0 <=>	.	1 <=>	.	0 <=>
MAY	.	0 <=>	.	3 <=>	.	36
JUN	.	0 <=>	.	3 <=>	.	16
JUL	.	45	.	.	.	.
AUG	.	0 <=>	.	64	.	.
SEP	.	1 <=>	.	75	.	1800
OCT	.	2 <=>	.	8 <=>	.	5 <=>
NOV	.	1 <=>	.	0 <=>	.	83
DEC	.	0 <=>	.	0 <=>	.	.

TOTAL COLIFORM MF (CT/100ML)

DET'N LIMIT = 0

GUIDELINE = 5/100ML(A1)

JAN	BDL	.	.	.	.	.
FEB	10 <=>	.	.	.	.	.
MAR	BDL	.	.	.	.	.
APR	BDL	.	.	.	.	.
MAY	BDL	.	.	.	.	.
JUN	BDL	.	.	.	.	.
JUL	BDL	.	.	.	.	.
AUG	BDL	.	.	.	.	.
SEP	BDL	.	.	.	.	.
NOV	BDL	.	.	.	.	.
DEC	BDL	.	.	.	.	.

T COLIFORM BCKGRD MF (CT/100ML)

DET'N LIMIT = 0

GUIDELINE = N/A

JAN	24000 >	.	.	.	.	.
FEB	20 <=>	.	.	.	.	.
MAR	BDL	.	.	.	.	.
APR	BDL	.	.	.	.	.
MAY	BDL	.	.	.	.	.
JUN	48000 >	.	.	.	.	.
JUL	16000	.	.	.	.	.
AUG	48000 >	.	.	.	.	.
SEP	24000 >	.	.	.	.	.
NOV	150	.	.	.	.	.
DEC	BDL	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM	
RAW	TREATED	SITE 1		SITE 2	
		STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)					
FLD CHLORINE (COMB) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.150	.200	.100	.	.100
FEB	.100	.200	.150	.	.200
MAR	.050	.150	.100	.100	.200
APR	.150	.800	.150	.100	.200
MAY	.200	.200	.150	.	.200
JUN	.150	.300	.100	.100	.200
JUL	.050	.200	.	.	.
AUG	.050	.200	.100	.	.
SEP	.050	.200	.150	.	.200
OCT	.150	.200	.100	.100	.200
NOV	.100	.250	.150	.200	.200
DEC	.150	.150	.100	.	.
FLD CHLORINE FREE (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.050	.600	.350	.	.900
FEB	.050	.800	.300	.	.300
MAR	.250	.850	.300	.300	.500
APR	.050	.200	.300	.300	.300
MAY	.050	.800	.250	.	.300
JUN	.050	.600	.200	.100	.100
JUL	.100	.800	.	.	.
AUG	.020	.700	.100	.	.
SEP	.050	.800	.200	.	.100
OCT	.100	.800	.150	.100	.100
NOV	.100	.800	.050	.100	.200
DEC	.400	1.000	.200	.	.
FLD CHLORINE (TOTAL) (MG/L)		DET'N LIMIT = 0	GUIDELINE = N/A		
JAN	.200	.800	.450	.	1.000
FEB	.150	1.000	.450	.	.500
MAR	.300	1.000	.400	.400	.700
APR	.200	1.000	.500	.400	.500
MAY	.250	1.000	.400	.	.500
JUN	.200	.900	.300	.200	.300
JUL	.150	1.000	.	.	.
AUG	.070	.900	.200	.	.
SEP	.100	1.000	.350	.	.300
OCT	.250	1.000	.250	.200	.300
NOV	.200	1.050	.200	.300	.400
DEC	.550	1.150	.300	.	.
FLD PH (DMNSLESS)		DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
JAN	7.600	7.500	7.600	.	7.600
FEB	7.700	7.500	7.500	.	7.600
MAR	7.650	7.300	7.500	7.400	7.600
APR	7.600	7.500	7.550	7.400	7.600
MAY	7.600	7.500	7.500	.	7.600
JUN	7.650	7.500	7.650	7.600	7.600
JUL	7.700	7.400	.	.	.
AUG	7.500	7.600	7.600	.	.
SEP	7.500	7.500	7.700	.	7.600
OCT	7.800	7.600	7.600	7.400	7.600
NOV	7.700	7.550	7.550	7.400	7.600
DEC	7.700	7.500	7.450	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
FLD TEMPERATURE (DEG.C)		DET'N LIMIT = N/A		GUIDELINE = 15 (A3)			
JAN	.100	3.000	.		7.000	.	8.000
FEB	2.000	2.000	.		5.500	.	10.000
MAR	2.000	2.000	10.500		5.000	12.000	7.000
APR	4.000	4.000	12.000		7.000	11.000	8.000
MAY	9.000	8.500	17.000		12.000	.	12.000
JUN	12.500	14.000	17.000		14.500	15.000	17.000
JUL	16.000	15.000	.		.	.	.
AUG	16.000	18.000	21.000		19.000	.	.
SEP	19.000	20.000	22.000		20.000	.	19.000
OCT	16.000	16.000	.		18.000	19.000	18.000
NOV	13.000	12.000	15.500		14.000	22.000	17.000
DEC	8.500	7.500	14.000		11.000	.	.
FLD TURBIDITY (FTU)		DET'N LIMIT = N/A		GUIDELINE = 1 (A1)			
JAN	1.820	.040	.		.300	.	.200
FEB	8.600	.030	.		.240	.	.180
MAR	8.400	.030	.750		.120	.900	.150
APR	4.040	.030	.		.120	.420	.130
MAY	5.200	.280	1.150		.200	.	.220
JUN	34.500	.040	1.200		.200	.600	.220
JUL	3.510	.030	.		.	.	.
AUG	1.500	.070	1.630		.440	.	.
SEP	2.620	.080	1.100		.180	.	.220
OCT	55.000	.060	.		.	.380	.220
NOV	6.100	.050	.950		.150	.250	.200
DEC	14.500	.040	.300		.180	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)							
ALKALINITY (MG/L)				DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
JAN	101.700	94.900	.	.	95.000	.	95.800
FEB	96.700	87.000	.	.	87.500	.	87.400
MAR	90.600	83.100	85.100	.	83.500	85.200	84.400
APR	96.600	88.200	90.200	.	88.900	90.700	90.500
MAY	97.400	89.800	93.100	.	90.900	.	91.200
JUN	96.300	89.500	91.000	.	90.500	90.200	90.000
JUL	97.400	90.400	.	.	.	.	.
AUG	108.100	95.600	98.900	.	94.000	.	.
SEP	98.100	89.800	90.400	.	90.300	.	89.600
OCT	94.900	83.800	.	.	84.300	85.800	85.500
NOV	93.400	87.000	88.900	.	88.100	88.800	88.900
DEC	95.400	87.700	90.500	.	87.800	.	.
CALCIUM (MG/L)							
				DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
JAN	35.300	35.800	.	.	34.400	.	36.100
FEB	36.800	36.200	.	.	36.600	.	35.800
MAR	34.460	33.800	36.450	.	35.040	36.140	34.420
APR	36.200	36.000	36.600	.	36.000	36.200	36.600
MAY	35.200	35.900	35.600	.	35.800	.	36.400
JUN	36.700	36.300	36.600	.	36.200	36.500	35.700
JUL	36.400	36.400	.	.	.	.	.
AUG	42.600	38.800	40.300	.	39.400	.	.
SEP	37.000	37.000	37.000	.	37.000	.	35.800
OCT	37.100	36.200	.	.	35.000	36.000	36.600
NOV	34.400	35.200	34.700	.	35.100	35.100	34.600
DEC	37.500	38.600	38.900	.	38.400	.	.
CHLORIDE (MG/L)							
				DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
JAN	14.200	15.500	.	.	15.600	.	15.500
FEB	14.900	16.400	.	.	16.400	.	16.200
MAR	13.700	15.400	13.800	.	15.600	15.700	15.400
APR	14.000	16.200	17.400	.	16.100	16.400	16.100
MAY	14.500	16.700	17.700	.	16.600	.	16.500
JUN	15.300	17.200	18.400	.	17.200	17.400	17.000
JUL	15.500	17.400	.	.	.	.	.
AUG	16.100	17.200	20.900	.	18.200	.	.
SEP	15.200	17.500	18.400	.	17.700	.	17.600
OCT	15.500	18.100	.	.	18.100	18.200	18.100
NOV	14.500	16.400	15.700	.	16.200	15.600	16.200
DEC	15.500	17.600	18.200	.	18.200	.	.
COLOUR (NZU)							
				DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
JAN	1.000 <T	.500 <T	.	.	1.000 <T	.	.500 <T
FEB	BDL	.500 <T	.	.	1.500 <T	.	1.500 <T
MAR	BDL	BDL	3.000	.	1.500 <T	2.000 <T	1.000 <T
APR	BDL	2.500	5.500	.	1.500 <T	1.500 <T	1.500 <T
MAY	.500 <T	.500 <T	4.500	.	.500 <T	.	2.000 <T
JUN	BDL	.500 <T	4.500	.	2.000 <T	1.500 <T	2.000 <T
JUL	1.000 <T	1.000 <T	.	.	.	.	.
AUG	2.000 <T	.500 <T	1.500 <T	.	BDL	.	.
SEP	1.500 <T	.500 <T	4.500	.	1.000 <T	.	1.000 <T
OCT	BDL	BDL	.	.	1.000 <T	1.500 <T	1.500 <T
NOV	1.000 <T	1.500 <T	4.000	.	2.000 <T	1.500 <T	1.500 <T
DEC	BDL	1.500 <T	1.000 <T	.	2.000 <T	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATNAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

SITE 2

STANDING

FREE FLOW

STANDING

FREE FLOW

CONDUCTIVITY (UMHO/CM)

DET'N LIMIT = 1.

GUIDELINE = 400 (F2)

JAN	287	290	.	290	.	291
FEB	281	283	.	285	.	281
MAR	264	271	277	273	276	273
APR	283	286	294	286	290	289
MAY	282	288	297	290	.	288
JUN	280	286	292	285	286	284
JUL	285	288	.	.	.	.
AUG	303	297	315	293	.	.
SEP	288	289	292	291	.	288
OCT	282	288	.	287	289	288
NOV	279	283	288	286	286	287
DEC	282	294	296	294	.	.

DISS ORG CARBON (MG/L)

DET'N LIMIT = .100

GUIDELINE = 5.0 (A3)

JAN	1.700	1.500	.	1.500	.	1.600
FEB	1.900	1.500	.	1.500	.	1.400
MAR	1.800	1.300	2.200	1.200	1.700	1.300
APR	1.900	1.500	2.100	1.500	1.600	1.500
MAY	2.000	1.700	1.900	1.700	.	1.700
JUN	2.400	2.100	2.100	2.100	2.000	2.100
JUL	1.800	1.700	.	.	.	.
AUG	2.100	1.700	2.200	1.700	.	.
SEP	1.700	1.500	1.700	1.500	.	1.400
OCT	2.000	1.700	.	1.500	1.600	1.500
NOV	1.800	1.500	1.800	1.600	1.600	1.500
DEC	1.900	1.400	1.200	1.300	.	.

FLUORIDE (MG/L)

DET'N LIMIT = 0.01

GUIDELINE = 2.4 (A1)

JAN	.120	.100	.	.100	.	.100
FEB	.100	.080	.	.080	.	.080
MAR	.100	.080	.100	.080	.080	.080
APR	.100	.100	.100	.100	.100	.100
MAY	.100	.100	.060	.080	.	.080
JUN	.100	.120	.120	.100	.120	.100
JUL	.120	.100	.	.	.	.
AUG	.120	.120	.120	.100	.	.
SEP	.080	.080	.080	.080	.	.080
OCT	.120	.100	.	.100	.100	.080
NOV	.140	.140	.140	.140	.140	.140
DEC	.100	.100	.100	.100	.	.

HARDNESS (MG/L)

DET'N LIMIT = 0.5

GUIDELINE = 80-100 (A4)

JAN	124.500	125.300	.	121.400	.	126.100
FEB	128.000	126.000	.	126.000	.	124.000
MAR	121.000	119.000	126.000	121.000	125.000	120.000
APR	125.000	124.000	126.000	124.000	125.000	126.000
MAY	123.100	124.300	123.800	124.500	.	125.400
JUN	126.000	124.800	127.400	124.400	125.100	122.900
JUL	127.000	128.000	.	.	.	.
AUG	143.700	133.100	137.300	135.600	.	.
SEP	127.000	126.000	127.000	127.000	.	123.000
OCT	129.100	125.000	.	123.000	125.000	127.000
NOV	121.600	123.300	122.600	122.900	122.600	121.600
DEC	129.200	132.400	133.100	131.800	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
IONCAL (DMNSLESS)				DET'N LIMIT = N/A		GUIDELINE = N/A	
JAN	4.042		2.321	.	5.386	.	2.031
FEB	2.110		1.730	.	1.214	.	.541
MAR	3.124		.363	6.500	.937	2.750	.317
APR	.182		.013	.401	.054	1.568	.267
MAY	1.633		1.095	4.051	1.452	.	.511
JUN	1.533		.071	1.029	.730	.043	.836
JUL	.948		1.348	.	.	.	.
AUG	4.098		1.245	2.016	3.583	.	.
SEP	.046		.142	.573	.146	.	1.516
OCT	3.439		.351	.	.575	.030	1.679
NOV	.196		.918	.252	.407	.474	1.687
DEC	3.666		3.513	1.646	2.234	.	.
LANGELIERS INDEX (DMNSLESS)				DET'N LIMIT = N/A		GUIDELINE = N/A	
JAN	.481		.436	.	.379	.	.433
FEB	.320		.146	.	.142	.	.124
MAR	.269		.131	.152	.068	.279	.185
APR	.431		.318	.292	.312	.341	.345
MAY	.443		.274	.273	.287	.	.347
JUN	.297		.138	.127	.132	.194	.164
JUL	.436		.373	.	.	.	.
AUG	.473		.431	.378	.362	.	.
SEP	.406		.377	.258	.288	.	.292
OCT	.465		.148	.	.116	.165	.191
NOV	.346		.304	.305	.297	.330	.314
DEC	.382		.243	.249	.251	.	.
MAGNESIUM (MG/L)				DET'N LIMIT = 0.10		GUIDELINE = 30 (F2)	
JAN	8.800		8.750	.	8.600	.	8.750
FEB	8.700		8.600	.	8.400	.	8.400
MAR	8.450		8.300	8.600	8.100	8.400	8.150
APR	8.400		8.400	8.400	8.300	8.300	8.300
MAY	8.550		8.450	8.500	8.500	.	8.400
JUN	8.350		8.300	8.750	8.250	8.250	8.200
JUL	8.900		9.000	.	.	.	.
AUG	9.050		8.800	8.900	9.000	.	.
SEP	8.300		8.200	8.400	8.300	.	8.200
OCT	8.850		8.500	.	8.800	8.600	8.700
NOV	8.700		8.600	8.700	8.600	8.450	8.550
DEC	8.700		8.750	8.750	8.700	.	.
SODIUM (MG/L)				DET'N LIMIT = 0.2		GUIDELINE = 200 (A4)	
JAN	7.400		7.500	.	7.400	.	7.700
FEB	8.000		8.000	.	7.800	.	7.800
MAR	7.600		7.200	7.700	7.300	7.400	7.200
APR	7.400		7.400	8.400	7.600	7.400	7.400
MAY	7.700		7.700	8.300	7.900	.	7.800
JUN	8.200		8.200	9.000	8.200	8.200	8.200
JUL	8.000		8.000	.	.	.	.
AUG	8.100		7.900	10.100	8.200	.	.
SEP	8.000		8.200	8.400	8.000	.	8.000
OCT	8.000		7.800	.	7.600	8.000	7.800
NOV	7.600		7.700	8.000	7.900	7.600	7.800
DEC	7.800		7.700	7.900	8.000	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM		
RAW	TREATED	SITE 1	SITE 2		
		STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
JAN	BDL	BDL	BDL	.	BDL
FEB	BDL	BDL	BDL	.	BDL
MAR	BDL	BDL	BDL	.002 <T	BDL
APR	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	.	BDL
JUN	BDL	BDL	BDL	BDL	BDL
JUL	BDL	BDL	.	.	.
AUG	.008 <T	.004 <T	.080	.004 <T	.
SEP	.014	.002 <T	.092	.004 <T	.002 <T
OCT	BDL	.002 <T	.	.004 <T	.008 <T
NOV	BDL	BDL	.006 <T	BDL	BDL
DEC	.004 <T	BDL	.008 <T	.004 <T	.
NITRITE (MG/L)		DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
JAN	.004 <T	.002 <T	.	.003 <T	.003 <T
FEB	.003 <T	BDL	.	BDL	BDL
MAR	.003 <T	BDL	.001 <T	BDL	BDL
APR	.002 <T	BDL	.002 <T	BDL	BDL
MAY	.002 <T	BDL	.002 <T	.001 <T	.002 <T
JUN	.009	BDL	.002 <T	BDL	.001 <T
JUL	.007	.008	.	.	.
AUG	.002 <T	.001 <T	.008	.001 <T	.
SEP	.002 <T	.001 <T	.004 <T	.002 <T	.002 <T
OCT	.016	BDL	.	BDL	.001 <T
NOV	.003 <T	.001 <T	.002 <T	.001 <T	.001 <T
DEC	.006	BDL	.006	.005	.
TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
JAN	.210	.215	.	.205	.210
FEB	.230	.295	.	.340	.290
MAR	.385	.435	.450	.435	.430
APR	.320	.315	.295	.275	.280
MAY	.130	.135	.140	.130	.135
JUN	.100	.115	.140	.120	.115
JUL	.240	.245	.	.	.
AUG	.285	.305	.285	.295	.
SEP	.330	.295	.270	.280	.265
OCT	.110	.105	.	.115	.110
NOV	.130	.130	.130	.120	.120
DEC	.135	.140	.125	.130	.
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02	GUIDELINE = N/A		
JAN	.250	.170	.	.170	.160
FEB	.230	.150	.	.160	.140
MAR	.230	.100	.250	.110	.110
APR	.210	.140	.390	.140	.150
MAY	.230	.160	.390	.160	.340
JUN	.280	.160	.420	.140	.130
JUL	.260	.170	.	.	.
AUG	.250	.180	.730	.170	.
SEP	.180	.120	.290	.120	.100
OCT	.375	.590	.	.670	.480
NOV	.250	.120	.210	.140	.140
DEC	.170	.070 <T	.310	.100	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PH (DMMSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)		
JAN	8.360	8.340	.	8.300	.	8.330
FEB	8.200	8.080	.	8.070	.	8.060
MAR	8.200	8.110	8.090	8.030	8.220	8.150
APR	8.320	8.250	8.210	8.240	8.260	8.260
MAY	8.340	8.200	8.190	8.210	.	8.260
JUN	8.180	8.060	8.040	8.050	8.110	8.090
JUL	8.320	8.290	.	.	.	.
AUG	8.250	8.300	8.220	8.230	.	.
SEP	8.280	8.290	8.170	8.200	.	8.220
OCT	8.350	8.100	.	8.080	8.110	8.130
NOV	8.270	8.250	8.250	8.240	8.270	8.260
DEC	8.260	8.150	8.140	8.160	.	.
PHOSPHORUS FIL REACT (MG/L)		DET'N LIMIT = 0.0005		GUIDELINE = N/A		
JAN	.001 <T	BDL	.	.	.	.
FEB	.005	.000 <T	.	.	.	.
MAR	.006	.000 <T	.	.	.	.
APR	.002 <T	BDL	.	.	.	.
MAY	.003	BDL	.	.	.	.
JUN	.017	.000 <T	.	.	.	.
JUL	.012	BDL	.	.	.	.
AUG	.001 <T	BDL	.	.	.	.
SEP	.	BDL	.	.	.	.
OCT	.036	BDL	.	.	.	.
NOV	.009	.001 <T	.	.	.	.
DEC	.011	.001 <T	.	.	.	.
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = .40 (F2)		
JAN	.017	.003 <T	.	.	.	.
FEB	.015	BDL	.	.	.	.
MAR	.018	BDL	.	.	.	.
APR	.021	.006 <T	.	.	.	.
MAY	.013	.002 <T	.	.	.	.
JUN	.036	BDL	.	.	.	.
JUL	.014	BDL	.	.	.	.
AUG	.016	.004 <T	.	.	.	.
SEP	.011	.003 <T	.	.	.	.
OCT	.043	.015	.	.	.	.
NOV	.093	.067	.	.	.	.
DEC	.026	.002 <T	.	.	.	.
SULPHATE (MG/L)		DET'N LIMIT = .200		GUIDELINE = 500 (A3)		
JAN	22.620	26.290	.	25.890	.	26.210
FEB	22.560	28.340	.	28.150	.	27.690
MAR	20.960	27.150	27.120	27.210	27.050	26.750
APR	22.790	27.160	26.730	26.730	26.810	26.630
MAY	22.760	27.660	27.890	27.620	.	27.000
JUN	22.440	27.190	26.870	26.870	26.660	26.370
JUL	22.420	26.400	.	.	.	.
AUG	22.100	26.320	25.820	26.090	.	.
SEP	22.340	27.030	26.260	26.730	.	26.150
OCT	23.370	30.810	.	29.450	29.480	29.120
NOV	23.150	26.970	27.500	28.170	27.160	27.490
DEC	22.490	29.760	30.000	30.580	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TURBIDITY (FTU)		DET'N LIMIT = 0.05		GUIDELINE = 1 (A1)		
JAN	2.500	.450	.	.290	.	.350
FEB	15.500	1.310	.	.970	.	.580
MAR	11.000	.490	.980	.350	1.400	.420
APR	11.000	1.200	3.000	.360	.860	.310
MAY	9.000	1.140	1.900	.260	.	.540
JUN	40.000	1.300	3.800	.660	1.500	.910
JUL	3.600	1.400	.	.	.	.
AUG	1.700	.590	2.600	1.700	.	.
SEP	1.900	.400	1.300	.350	.	.480
OCT	54.000	.340	.	.560	.930	.650
NOV	14.600	.890	2.100	.750	.890	.850
DEC	18.600	2.900	.710	.500	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT				DISTRIBUTION SYSTEM			
RAW		TREATED		SITE 1		SITE 2	
		STANDING		FREE FLOW		STANDING	
METALS							
ALUMINUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 100 (A4)			
JAN	22.000	50.000	.	35.000	.	.	38.000
FEB	89.000	34.000	.	27.000	.	.	27.000
MAR	82.000	22.000	23.000	17.000	30.000	.	18.000
APR	45.000	42.000	41.000	37.000	43.000	.	38.000
MAY	73.000	60.000	54.000	47.000	.	.	52.000
JUN	210.000	140.000	89.000	92.000	.	.	100.000
JUL	45.000	130.000	.	.	.	.	.
AUG	21.000	110.000	92.000	81.000	.	.	.
SEP	330.000	140.000	100.000	100.000	.	.	120.000
OCT	340.000	110.000	.	83.000	94.000	.	91.000
NOV	120.000	120.000	85.000	86.000	80.000	.	81.000
DEC	100.000	60.000	43.000	47.000	.	.	.
ARSENIC (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 25 (A1)			
JAN	.690 <T	.300 <T	.	.140 <T	.	.	.330 <T
FEB	.720 <T	.300 <T	.	.270 <T	.	.	.280 <T
MAR	.420 <T	BDL	.200 <T	.200 <T	.280 <T	.	BDL
APR	.640 <T	.320 <T	.240 <T	.270 <T	.310 <T	.	.240 <T
MAY	.500 <T	.190 <T	.190 <T	BDL	.	.	.130 <T
JUN	.400 <T	BDL	BDL	BDL	.	.	BDL
JUL	.420 <T	.310 <T	.	.	.	.	.
AUG	.910 <T	.340 <T	.480 <T	.410 <T	.	.	.
SEP	.840 <T	.230 <T	.250 <T	BDL	.	.	BDL
OCT	1.400	.420 <T	.	.310 <T	.280 <T	.	.320 <T
NOV	.930 <T	.250 <T	.210 <T	.150 <T	.190 <T	.	.190 <T
DEC	.650 <T	BDL	BDL	BDL	.	.	.
BARIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 1000 (A2)			
JAN	20.000	20.000	.	19.000	.	.	19.000
FEB	23.000	21.000	.	20.000	.	.	19.000
MAR	18.000	17.000	19.000	17.000	18.000	.	17.000
APR	19.000	18.000	19.000	19.000	19.000	.	19.000
MAY	20.000	19.000	21.000	20.000	.	.	19.000
JUN	24.000	21.000	23.000	21.000	.	.	21.000
JUL	21.000	21.000	.	.	.	.	.
AUG	25.000	24.000	24.000	23.000	.	.	.
SEP	40.000	23.000	23.000	23.000	.	.	22.000
OCT	25.000	20.000	.	21.000	21.000	.	20.000
NOV	20.000	19.000	19.000	19.000	18.000	.	19.000
DEC	19.000	18.000	19.000	18.000	.	.	.
BORON (UG/L)		DET'N LIMIT = 2.00		GUIDELINE = 5000 (A1)			
JAN	22.000	22.000	.	22.000	.	.	21.000
FEB	23.000	22.000	.	23.000	.	.	22.000
MAR	20.000 <T	18.000 <T	20.000 <T	19.000 <T	18.000 <T	.	18.000 <T
APR	32.000	31.000	26.000	23.000	23.000	.	22.000
MAY	40.000	56.000	68.000	60.000	.	.	45.000
JUN	62.000	57.000	80.000	64.000	.	.	58.000
JUL	22.000	22.000	.	.	.	.	.
AUG	40.000	36.000	92.000	36.000	.	.	.
SEP	66.000	30.000	33.000	31.000	.	.	29.000
OCT	26.000	24.000	.	25.000	25.000	.	24.000
NOV	22.000	22.000	31.000	22.000	21.000	.	20.000 <T
DEC	20.000 <T	20.000 <T	20.000 <T	21.000	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW

TREATED

SITE 1

SITE 2

STANDING

FREE FLOW

STANDING

FREE FLOW

BERYLLIUM (UG/L)

DET'N LIMIT = 0.05

GUIDELINE = 6800 (D4)

JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL
APR	.070 <T	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	.060 <T	BDL	.	BDL
JUN	.060 <T	BDL	.070 <T	.080 <T	.	.060 <T
JUL	BDL	BDL	.	.	.	.
AUG	.060 <T	BDL	.060 <T	BDL	.	.
SEP	.070 <T	BDL	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	.	.

CADMIUM (UG/L)

DET'N LIMIT = 0.05

GUIDELINE = 5 (A1)

JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.280 <T	BDL	.200 <T	BDL
APR	BDL	BDL	.140 <T	BDL	.060 <T	BDL
MAY	BDL	BDL	.150 <T	BDL	.	BDL
JUN	BDL	BDL	.130 <T	BDL	.	BDL
JUL	.060 <T	.060 <T	.	.	.	.
AUG	BDL	BDL	.690	BDL	.	.
SEP	BDL	BDL	.170 <T	BDL	.	BDL
OCT	.070 <T	BDL	.	BDL	.060 <T	BDL
NOV	BDL	BDL	.070 <T	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	.	.

COBALT (UG/L)

DET'N LIMIT = 0.02

GUIDELINE = N/A

JAN	.120 <T	.080 <T	.	.120 <T	.	.060 <T
FEB	.230 <T	BDL	.	.050 <T	.	BDL
MAR	.130 <T	.080 <T	.190 <T	.030 <T	.120 <T	.100 <T
APR	.140 <T	.040 <T	.170 <T	.130 <T	.160 <T	.130 <T
MAY	.220 <T	.170 <T	.190 <T	.140 <T	.	.130 <T
JUN	.290 <T	.030 <T	.080 <T	BDL	.	BDL
JUL	.170 <T	.170 <T	.	.	.	.
AUG	.040 <T	.070 <T	.150 <T	.050 <T	.	.
SEP	.520 <T	.050 <T	.060 <T	BDL	.	.040 <T
OCT	.480 <T	.070 <T	.	BDL	.080 <T	.040 <T
NOV	.240 <T	.040 <T	.120 <T	BDL	.030 <T	.050 <T
DEC	.220 <T	.100 <T	.060 <T	.060 <T	.	.

CHROMIUM (UG/L)

DET'N LIMIT = 0.50

GUIDELINE = 50 (A1)

JAN	BDL	BDL	.	BDL	.	BDL
FEB	BDL	BDL	.	BDL	.	.630 <T
MAR	BDL	.680 <T	.700 <T	.610 <T	.650 <T	.550 <T
APR	1.800 <T	2.100 <T	.890 <T	.510 <T	.570 <T	.590 <T
MAY	1.000 <T	2.000 <T	2.000 <T	2.000 <T	.	1.300 <T
JUN	3.000 <T	2.700 <T	2.800 <T	2.800 <T	.	2.600 <T
JUL	1.300 <T	1.900 <T	.	.	.	.
AUG	3.200 <T	2.900 <T	2.600 <T	2.800 <T	.	.
SEP	3.800 <T	2.000 <T	2.200 <T	2.300 <T	.	2.000 <T
OCT	3.000 <T	2.500 <T	.	2.800 <T	2.400 <T	2.600 <T
NOV	1.300 <T	1.300 <T	1.300 <T	1.200 <T	1.100 <T	.700 <T
DEC	BDL	.650 <T	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
COPPER (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)			
JAN	1.400 <T	1.100 <T	.	5.600	.	3.600 <T	
FEB	2.000 <T	.900 <T	.	7.800	.	7.400	
MAR	1.400 <T	.960 <T	54.000	5.300	58.000	4.800 <T	
APR	1.300 <T	.880 <T	74.000	5.400	29.000	4.900 <T	
MAY	1.700 <T	.990 <T	53.000	7.500	.	4.200 <T	
JUN	3.100 <T	1.100 <T	52.000	6.100	.	4.600 <T	
JUL	1.700 <T	1.600 <T	.	.	.	.	
AUG	1.700 <T	1.600 <T	62.000	9.800	.	.	
SEP	7.300	1.600 <T	50.000	14.000	.	9.000	
OCT	2.400 <T	.850 <T	.	5.600	14.000	6.600	
NOV	2.100 <T	1.100 <T	19.000	2.800 <T	13.000	7.300	
DEC	1.800 <T	1.000 <T	15.000	4.500 <T	.	.	
IRON (UG/L)		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)			
JAN	45.000 <T	14.000 <T	.	33.000 <T	.	27.000 <T	
FEB	230.000	43.000 <T	.	61.000	.	75.000	
MAR	130.000	8.300 <T	160.000	55.000 <T	120.000	53.000 <T	
APR	57.000 <T	45.000 <T	310.000	45.000 <T	85.000	61.000	
MAY	150.000	26.000 <T	210.000	37.000 <T	.	94.000	
JUN	390.000	80.000	200.000	90.000	.	82.000	
JUL	63.000	110.000	.	.	.	.	
AUG	35.000 <T	56.000 <T	270.000	67.000	.	.	
SEP	540.000	37.000 <T	250.000	78.000	.	75.000	
OCT	630.000	21.000 <T	.	55.000 <T	98.000	81.000	
NOV	320.000	54.000 <T	160.000	62.000	60.000 <T	60.000 <T	
DEC	220.000	28.000 <T	110.000	71.000	.	.	
MERCURY (UG/L)		DET'N LIMIT = 0.02		GUIDELINE = 1 (A1)			
JAN	.020 <T	.020 <T	.	.	.	.	
FEB	BDL	BDL	.	.	.	.	
MAR	BDL	BDL	.	.	.	.	
APR	.180	BDL	.	.	.	.	
MAY	.160	BDL	.	.	.	.	
JUN	.030 <T	BDL	.	.	.	.	
JUL	.200	BDL	.	.	.	.	
AUG	.070 <T	BDL	.	.	.	.	
SEP	.090 <T	BDL	.	.	.	.	
OCT	BDL	BDL	.	.	.	.	
NOV	.040 <T	BDL	.	.	.	.	
DEC	.120	.160	.	.	.	.	
MANGANESE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 50 (A3)			
JAN	4.100	.520	.	7.900	.	3.400	
FEB	12.000	.850	.	10.000	.	7.800	
MAR	5.600	.580	11.000	10.000	7.500	7.000	
APR	2.700	.590	13.000	9.500	7.800	7.200	
MAY	8.800	.890	14.000	8.000	.	9.100	
JUN	32.000	2.700	17.000	12.000	.	10.000	
JUL	5.000	3.000	.	.	.	.	
AUG	110.000	6.200	38.000	17.000	.	.	
SEP	78.000	4.700	26.000	12.000	.	10.000	
OCT	20.000	.430 <T	.	12.000	9.400	8.700	
NOV	20.000	.640	19.000	13.000	7.700	7.300	
DEC	12.000	.730	13.000	11.000	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = N/A		
JAN	1.100	1.200	.	.	1.100	.	1.200
FEB	1.000	1.300	.	.	1.200	.	1.300
MAR	.740	.930	1.000	.	1.100	1.200	1.300
APR	.870	.860	.940	.	1.200	1.100	1.000
MAY	1.100	1.200	1.000	.	1.000	.	1.100
JUN	.600	1.200	1.200	.	1.200	.	.990
JUL	1.200	1.000	.	.	.	.	.
AUG	1.300	1.200	1.100	.	1.200	.	.
SEP	1.500	1.100	1.100	.	1.100	.	1.200
OCT	1.500	1.500	.	.	1.300	1.400	1.300
NOV	.960	1.200	1.100	.	1.200	1.200	1.200
DEC	.970	1.500	1.400	.	1.300	.	.
NICKEL (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
JAN	1.500 <T	2.200	.	.	1.100 <T	.	1.300 <T
FEB	.990 <T	.530 <T	.	.	.850 <T	.	.650 <T
MAR	1.100 <T	.990 <T	4.200	.	.860 <T	4.800	.730 <T
APR	1.100 <T	.650 <T	2.600	.	1.400 <T	4.300	1.500 <T
MAY	1.600 <T	1.400 <T	3.400	.	1.500 <T	.	1.500 <T
JUN	1.100 <T	BDL	3.600	.	BDL	.	BDL
JUL	1.300 <T	1.100 <T	.	.	.	.	.
AUG	1.500 <T	1.200 <T	9.600	.	1.300 <T	.	.
SEP	.740 <T	BDL	3.800	.	BDL	.	BDL
OCT	.640 <T	BDL	.	.	BDL	1.500 <T	BDL
NOV	.570 <T	.370 <T	1.100 <T	.	.320 <T	.610 <T	.260 <T
DEC	.910 <T	.610 <T	.690 <T	.	.600 <T	.	.
LEAD (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
JAN	.100 <T	.220 <T	.	.	.310 <T	.	.140 <T
FEB	.460 <T	.420 <T	.	.	.830	.	2.900
MAR	.170 <T	.080 <T	3.600	.	.250 <T	9.000	.280 <T
APR	.170 <T	.320 <T	5.300	.	.310 <T	3.500	.260 <T
MAY	.200 <T	.270 <T	5.700	.	.390 <T	.	.110 <T
JUN	.910	2.800	4.800	.	.230 <T	.	.270 <T
JUL	.120 <T	2.100	.	.	.	.	.
AUG	.090 <T	.450 <T	7.300	.	.570	.	.
SEP	2.100	.620	5.000	.	6.700	.	.490 <T
OCT	.510	.190 <T	.	.	.310 <T	3.000	.400 <T
NOV	.380 <T	.320 <T	3.100	.	.260 <T	.840	.280 <T
DEC	.340 <T	.190 <T	1.600	.	.330 <T	.	.
ANTIMONY (UG/L)				DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
JAN	.430 <T	.450 <T	.	.	.430 <T	.	.450 <T
FEB	.600	.480 <T	.	.	.450 <T	.	.570
MAR	.440 <T	.470 <T	.550	.	.450 <T	.530	.480 <T
APR	.380 <T	.440 <T	.500 <T	.	.620	.720	.550
MAY	.440 <T	.340 <T	.530	.	.390 <T	.	.460 <T
JUN	.440 <T	.480 <T	.580	.	.600	.	.620
JUL	.610	.600	.	.	.	.	.
AUG	.610	.570	.770	.	.550	.	.
SEP	.570	.550	.680	.	.430 <T	.	.600
OCT	.430 <T	.460 <T	.	.	.470 <T	.640	.510
NOV	.550	.400 <T	.440 <T	.	.510	.530	.520
DEC	.510	.570	.530	.	.580	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
SELENIUM (UG/L)		DET'N LIMIT = 1.00		GUIDELINE = 10 (A1)			
JAN	BDL	BDL	.	BDL	.	BDL	BDL
FEB	BDL	BDL	.	BDL	.	BDL	BDL
MAR	1.700 <T	2.000 <T	1.100 <T	BDL	2.000 <T	1.800 <T	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAY	1.200 <T	1.300 <T	1.500 <T	1.600 <T	.	2.000 <T	BDL
JUN	BDL	2.100 <T	2.300 <T	2.600 <T	.	1.400 <T	BDL
JUL	BDL	BDL	.	.	.	.	.
AUG	BDL	1.300 <T	BDL	BDL	.	.	.
SEP	BDL	BDL	1.400 <T	BDL	.	.	.
OCT	2.400 <T	1.700 <T	.	2.300 <T	2.100 <T	1.800 <T	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	.	.	.
STRONTIUM (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = N/A			
JAN	160.000	160.000	.	160.000	.	160.000	160.000
FEB	180.000	160.000	.	170.000	.	160.000	160.000
MAR	140.000	140.000	140.000	140.000	140.000	140.000	140.000
APR	140.000	140.000	140.000	150.000	160.000	160.000	160.000
MAY	150.000	150.000	160.000	160.000	.	150.000	150.000
JUN	150.000	150.000	150.000	150.000	.	150.000	150.000
JUL	140.000	140.000	.	.	.	.	.
AUG	160.000	150.000	150.000	150.000	.	.	.
SEP	710.000	160.000	160.000	150.000	.	160.000	160.000
OCT	150.000	140.000	.	140.000	140.000	140.000	140.000
NOV	140.000	140.000	150.000	140.000	140.000	140.000	140.000
DEC	140.000	140.000	140.000	150.000	.	.	.
TITANIUM (UG/L)		DET'N LIMIT = 0.50		GUIDELINE = N/A			
JAN	3.800 <T	3.100 <T	.	3.000 <T	.	3.300 <T	3.300 <T
FEB	8.600	6.800	.	7.500	.	6.200	6.200
MAR	4.000 <T	2.800 <T	3.500 <T	3.700 <T	3.900 <T	3.300 <T	3.300 <T
APR	4.500 <T	2.800 <T	3.600 <T	2.900 <T	3.200 <T	3.100 <T	3.100 <T
MAY	7.700	5.400	6.200	5.600	.	5.900	5.900
JUN	8.900	5.300	5.000 <T	5.100	.	5.000 <T	5.000 <T
JUL	6.600	4.700 <T	.	.	.	.	.
AUG	7.700	4.400 <T	5.500	5.400	.	.	.
SEP	22.000	5.200	4.800 <T	5.300	.	4.300 <T	4.300 <T
OCT	8.600	3.300 <T	.	3.500 <T	3.500 <T	3.200 <T	3.200 <T
NOV	4.600 <T	1.900 <T	2.400 <T	1.800 <T	2.000 <T	1.900 <T	1.900 <T
DEC	4.900 <T	1.600 <T	1.600 <T	1.500 <T	.	.	.
THALLIUM (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 13 (D4)			
JAN	BDL	BDL	.	BDL	.	BDL	BDL
FEB	BDL	BDL	.	BDL	.	BDL	BDL
MAR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MAY	BDL	BDL	BDL	BDL	.	BDL	BDL
JUN	BDL	BDL	BDL	BDL	.	BDL	BDL
JUL	BDL	BDL	.	.	.	.	.
AUG	BDL	BDL	BDL	BDL	.	.	.
SEP	BDL	.060 <T	BDL	BDL	.	BDL	BDL
OCT	BDL	BDL	.	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
URANIUM (UG/L)		DET'N LIMIT = 0.05			GUIDELINE = 100 (A1)		
JAN	.350 <T	.290 <T	.	.	.310 <T	.	.280 <T
FEB	.460 <T	.250 <T	.	.	.260 <T	.	.260 <T
MAR	.380 <T	.230 <T	.180 <T	.	.190 <T	.210 <T	.170 <T
APR	.330 <T	.240 <T	.240 <T	.	.290 <T	.290 <T	.270 <T
MAY	.310 <T	.200 <T	.240 <T	.	.250 <T	.	.210 <T
JUN	.400 <T	.270 <T	.270 <T	.	.240 <T	.	.250 <T
JUL	.340 <T	.250 <T	.	.	.	.	.
AUG	.260 <T	.250 <T	.240 <T	.	.230 <T	.	.
SEP	.550	.250 <T	.250 <T	.	.260 <T	.	.260 <T
OCT	.500 <T	.190 <T	.	.	.230 <T	.260 <T	.240 <T
NOV	.350 <T	.290 <T	.220 <T	.	.260 <T	.220 <T	.240 <T
DEC	.350 <T	.190 <T	.190 <T	.	.200 <T	.	.
VANADIUM (UG/L)		DET'N LIMIT = 0.05			GUIDELINE = N/A		
JAN	.320 <T	.570	.	.	.440 <T	.	.460 <T
FEB	.490 <T	.640	.	.	.500 <T	.	.480 <T
MAR	.380 <T	.620	.480 <T	.	.410 <T	.770	.450 <T
APR	.230 <T	.490 <T	.390 <T	.	.450 <T	.580	.430 <T
MAY	.310 <T	.480 <T	.480 <T	.	.330 <T	.	.430 <T
JUN	.630	.470 <T	.340 <T	.	.240 <T	.	.260 <T
JUL	.380 <T	.820	.	.	.	.	.
AUG	.420 <T	.670	.710	.	.490 <T	.	.
SEP	1.600	.650	.590	.	.500 <T	.	.540
OCT	1.200	.930	.	.	.570	.720	.660
NOV	.530	.590	.520	.	.380 <T	.340 <T	.360 <T
DEC	.350 <T	.670	.280 <T	.	.290 <T	.	.
ZINC (UG/L)		DET'N LIMIT = 0.20			GUIDELINE = 5000 (A3)		
JAN	1.200 <T	1.000 <T	.	.	20.000	.	2.300
FEB	3.600	2.000 <T	.	.	21.000	.	6.900
MAR	2.000 <T	1.600 <T	220.000	.	26.000	73.000	5.300
APR	1.400 <T	.940 <T	150.000	.	31.000	44.000	3.500
MAY	1.900 <T	1.200 <T	230.000	.	35.000	.	2.600
JUN	4.900	1.600 <T	210.000	.	31.000	.	4.300
JUL	2.100	2.200	.	.	.	.	.
AUG	1.700 <T	1.200 <T	240.000	.	66.000	.	.
SEP	15.000	1.500 <T	230.000	.	45.000	.	7.500
OCT	3.700	1.200 <T	.	.	28.000	16.000	6.400
NOV	4.000	1.800 <T	330.000	.	40.000	18.000	8.800
DEC	3.500	6.200	490.000	.	25.000	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
RAW	TREATED	SITE 1		SITE 2		
		STANDING	FREE FLOW	STANDING	FREE FLOW	
-----CHLOROAROMATICS-----						
HEXACHLOROCYCLOPENTADIEN (NG/L)		DET'N LIMIT = 5.0		GUIDELINE = 206000 (D4)		
OCT	BDL	BDL	.	65.000	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED		SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW

PESTICIDES & PCB				DET'N LIMIT = 1.000		GUIDELINE = 700 (G)	
ALPHA BHC (NG/L)							
JAN	1.000 <T	1.000 <T	.	1.000 <T	.	1.000 <T	
FEB	BDL	BDL	.	BDL	.	BDL	
MAR	BDL	1LA	.	1LA	.	BDL	
APR	1.000 <T	1.000 <T	.	BDL	.	2.000 <T	
MAY	BDL	BDL	.	.	.	BDL	
JUN	1.000 <T	BDL	.	BDL	.	1.000 <T	
JUL	IIS	BDL	.	.	.	.	
AUG	BDL	BDL	.	2.000 <T	.	.	
SEP	1.000 <T	3.000 <T	.	1.000 <T	.	1.000 <T	
OCT	BDL	BDL	.	BDL	.	BDL	
NOV	1.000 <T	BDL	.	BDL	.	BDL	
DEC	BDL	BDL	.	BDL	.	.	

LINDANE (NG/L)				DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)	
JAN	BDL	BDL	.	BDL	.	BDL	
FEB	BDL	BDL	.	BDL	.	BDL	
MAR	BDL	1LA	.	1LA	.	BDL	
APR	BDL	BDL	.	BDL	.	BDL	
MAY	BDL	BDL	.	.	.	BDL	
JUN	BDL	BDL	.	BDL	.	BDL	
JUL	IIS	2.000 <T	.	.	.	.	
AUG	BDL	BDL	.	BDL	.	.	
SEP	BDL	BDL	.	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	.	BDL	
NOV	BDL	BDL	.	BDL	.	BDL	
DEC	BDL	BDL	.	BDL	.	.	

ATRAZINE (NG/L)				DET'N LIMIT = 50		GUIDELINE = 60000 (A2)	
JAN	BDL	BDL	.	IIS	.	.	
FEB	BDL	BDL	.	.	.	.	
MAR	BDL	BDL	.	.	.	.	
APR	BDL	BDL	.	.	.	.	
MAY	BDL	BDL	.	.	.	.	
JUN	110.000 <T	BDL	.	.	.	.	
JUL	90.000 <T	90.000 <T	.	.	.	.	
AUG	BDL	BDL	.	.	.	.	
SEP	80.000 <T	100.000 <T	.	.	.	.	
OCT	BDL	BDL	.	.	.	.	
NOV	190.000 <T	190.000 <T	.	.	.	.	
DEC	BDL	BDL	.	.	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT			DISTRIBUTION SYSTEM			
RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW

PHENOLICS						
PHENOLICS (UG/L	)		DET'N LIMIT = .200	GUIDELINE = 2	(A4)	
JAN	1.000 <T	7.800	.	.	.	.
FEB	.400 <T	.400 <T	.	.	.	.
MAR	1.000	.600 <T	.	.	.	.
APR	1.000	BDL	.	.	.	.
MAY	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
JUL	.600 <T	.400 <T	.	.	.	.
AUG	BDL	BDL	.	.	.	.
SEP	BDL	BDL	.	.	.	.
OCT	.600 <T	BDL	.	.	.	.
NOV	BDL	BDL	.	.	.	.
DEC	.600 <T	.800 <T	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES							
BENZENE (UG/L)	)	DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)			
JAN	BDL	BDL	.	BDL	.	IU	
FEB	BDL	BDL	.	BDL	.	BDL	
MAR	.100 <T	.150 <T	.	.150 <T	.	.050 <T	
APR	.100 <T	BDL	.	.100 <T	.	.050 <T	
MAY	BDL	BDL	.	BDL	.	BDL	
JUN	BDL	BDL	.	BDL	.	BDL	
JUL	BDL	.100 <T	.	.	.	.	
AUG	BDL	BDL	.	BDL	.	.	
SEP	BDL	BDL	.	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	.	BDL	
NOV	BDL	BDL	.	BDL	.	BDL	
DEC	BDL	BDL	.	BDL	.	.	
TOLUENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)			
JAN	BDL	BDL	.	.100 <T	.	IU	
FEB	.050 <T	.050 <T	.	BDL	.	BDL	
MAR	BDL	.100 <T	.	BDL	.	BDL	
APR	BDL	.050 <T	.	BDL	.	BDL	
MAY	BDL	BDL	.	BDL	.	BDL	
JUN	BDL	.050 <T	.	BDL	.	BDL	
JUL	.050 <T	BDL	.	.	.	.	
AUG	BDL	BDL	.	BDL	.	.	
SEP	.050 <T	BDL	.	BDL	.	.050 <T	
OCT	BDL	BDL	.	BDL	.	BDL	
NOV	BDL	BDL	.	BDL	.	BDL	
DEC	BDL	.100 <T	.	BDL	.	.	
ETHYLBENZENE (UG/L)		DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)			
JAN	BDL	BDL	.	.050 <T	.	IU	
FEB	BDL	BDL	.	BDL	.	BDL	
MAR	.150 <T	.350 <T	.	.250 <T	.	.100 <T	
APR	.100 <T	.550	.	.300 <T	.	.200 <T	
MAY	.050 <T	BDL	.	.150 <T	.	.150 <T	
JUN	.050 <T	.150 <T	.	.100 <T	.	.050 <T	
JUL	BDL	.150 <T	.	.	.	.	
AUG	BDL	.050 <T	.	.150 <T	.	.	
SEP	BDL	BDL	.	.200 <T	.	BDL	
OCT	BDL	.100 <T	.	.100 <T	.	BDL	
NOV	.100 <T	.150 <T	.	.150 <T	.	.150 <T	
DEC	BDL	.050 <T	.	.200 <T	.	.	
M-XYLENE (UG/L)		DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)			
JAN	BDL	BDL	.	BDL	.	IU	
FEB	BDL	BDL	.	BDL	.	BDL	
MAR	BDL	BDL	.	BDL	.	BDL	
APR	BDL	.100 <T	.	BDL	.	BDL	
MAY	BDL	BDL	.	BDL	.	BDL	
JUN	BDL	.100 <T	.	BDL	.	BDL	
JUL	BDL	BDL	.	.	.	.	
AUG	BDL	BDL	.	BDL	.	.	
SEP	BDL	BDL	.	BDL	.	BDL	
OCT	BDL	BDL	.	BDL	.	BDL	
NOV	BDL	BDL	.	BDL	.	BDL	
DEC	BDL	BDL	.	BDL	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)		
JAN	BDL	BDL	.	BDL	.	IU
FEB	BDL	BDL	.	BDL	.	BDL
MAR	.050 <T	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	.050 <T	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	.
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
JAN	.100 <T	BDL	.	BDL	.	IU
FEB	.100 <T	BDL	.	BDL	.	BDL
MAR	.300 <T	BDL	.	.100 <T	.	.050 <T
APR	BDL	BDL	.	.100 <T	.	.150 <T
MAY	.150 <T	BDL	.	.200 <T	.	.250 <T
JUN	.150 <T	BDL	.	.100 <T	.	.150 <T
JUL	.050 <T	BDL	.	.	.	.
AUG	BDL	BDL	.	.200 <T	.	.
SEP	BDL	BDL	.	.300 <T	.	.050 <T
OCT	.100 <T	BDL	.	.150 <T	.	.100 <T
NOV	.250 <T	BDL	.	.300 <T	.	.300 <T
DEC	BDL	BDL	.	.300 <T	.	.
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	1.600	30.300	.	26.100	.	IU
FEB	7.300	23.200	.	28.200	.	25.400
MAR	10.500	29.600	.	29.800	.	29.100
APR	7.800	42.700	.	36.000	.	33.500
MAY	6.100	30.300	.	36.100	.	28.900
JUN	8.500	32.100	.	28.900	.	26.400
JUL	6.300	29.400	.	.	.	.
AUG	2.200	23.800	.	19.900	.	.
SEP	5.400	26.800	.	25.500	.	23.800
OCT	13.100	38.900	.	31.200	.	30.000
NOV	9.100	25.200	.	21.100	.	22.600
DEC	15.600	21.200	.	23.900	.	.
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
JAN	BDL	BDL	.	.020 <T	.	IU
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	.120 <T	.	.660	.	BDL
JUN	BDL	.020 <T	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	.040 <T	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

RAW		TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TRICHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 50 (A1)		
JAN	BDL	BDL	.	BDL	.	1U
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	.100 <T	.	BDL
JUN	BDL	BDL	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	.
DICHLOBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)		
JAN	2.150	13.100	.	13.150	.	1U
FEB	6.200	10.400	.	12.350	.	11.550
MAR	8.250	13.150	.	13.250	.	13.850
APR	6.650	13.900	.	13.950	.	14.200
MAY	5.100	11.450	.	12.550	.	11.650
JUN	6.150	10.900	.	11.200	.	10.900
JUL	5.350	11.500	.	.	.	.
AUG	1.950	10.200	.	10.100	.	.
SEP	5.050	11.800	.	12.650	.	10.400
OCT	8.550	10.650	.	11.100	.	10.300
NOV	6.850	8.950	.	9.500	.	9.800
DEC	9.800	7.850	.	9.450	.	.
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
JAN	1.100	5.900	.	5.700	.	1U
FEB	2.900	4.300	.	5.000	.	4.500
MAR	3.200	4.700	.	4.800	.	5.400
APR	3.700	5.300	.	5.700	.	5.800
MAY	3.000	4.600	.	5.500	.	5.300
JUN	3.300	4.800	.	5.100	.	5.100
JUL	2.900	5.100	.	.	.	.
AUG	.800 <T	4.600	.	4.900	.	.
SEP	2.700	5.500	.	6.200	.	5.100
OCT	4.300	3.800	.	4.400	.	4.100
NOV	3.300	3.900	.	4.100	.	4.200
DEC	4.100	2.600	.	3.400	.	.
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)		
JAN	BDL	BDL	.	BDL	.	1U
FEB	BDL	BDL	.	BDL	.	BDL
MAR	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
MAY	BDL	BDL	.	BDL	.	BDL
JUN	BDL	.050 <T	.	BDL	.	BDL
JUL	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	BDL	.	.
SEP	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
NOV	BDL	.050 <T	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM CHATHAM WTP 1990

WATER TREATMENT PLANT

DISTRIBUTION SYSTEM

		RAW	TREATED	SITE 1		SITE 2	
				STANDING	FREE FLOW	STANDING	FREE FLOW
BROMOFORM (UG/L)				DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)		
JAN	BDL	.600 <T	.	.	.600 <T	.	1U
FEB	.400 <T	.400 <T	.	.	.400 <T	.	.400 <T
MAR	.400 <T	.400 <T	.	.	.400 <T	.	.400 <T
APR	.400 <T	.400 <T	.	.	.600 <T	.	.600 <T
MAY	.400 <T	.200 <T	.	.	.600 <T	.	.600 <T
JUN	.400 <T	.400 <T	.	.	.600 <T	.	.400 <T
JUL	.400 <T	.600 <T	.	.	.	.	.
AUG	BDL	.600 <T	.	.	.600 <T	.	.
SEP	.400 <T	.600 <T	.	.	.800 <T	.	.600 <T
OCT	.400 <T	.400 <T	.	.	.400 <T	.	.400 <T
NOV	.400 <T	.400 <T	.	.	.400 <T	.	.600 <T
DEC	.400 <T	.200 <T	.	.	.400 <T	.	.
TOTAL TRIHALOMETHANES (UG/L)				DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)		
JAN	4.800 <T	49.850	.	.	45.450	.	1U
FEB	16.750	38.250	.	.	45.900	.	41.900
MAR	22.400	47.750	.	.	48.250	.	48.700
APR	18.550	62.350	.	.	56.150	.	54.000
MAY	14.500	46.650	.	.	54.800	.	46.400
JUN	18.350	48.250	.	.	45.800	.	42.800
JUL	BDL	46.600	.	.	.	.	.
AUG	4.950 <T	39.200	.	.	35.500	.	.
SEP	13.500	44.850	.	.	45.100	.	39.950
OCT	26.400	53.750	.	.	47.100	.	44.750
NOV	19.650	38.450	.	.	35.200	.	37.200
DEC	29.850	31.900	.	.	37.000	.	.

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRAZONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADDEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
2,4-DICHLOROPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17 (D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

- i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
- ii/ the water being sampled is not being modified by the sampling system;
- iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
- iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P)

VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION: NAME: BENZENE

CAS#: 71-43-2

MOLECULAR FORMULAE: C₆H₆

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27).
CYCLOHEXATRIENE (41).

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41).

THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
THRESHOLD TASTE: 0.5 mg/L IN WATER (39).

ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).

ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE. CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.

MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:

MOLECULAR WEIGHT: 78.12

MELTING POINT: 5.5°C (27).

BOILING POINT: 80.1°C (27).

SPECIFIC GRAVITY: 0.8790 AT 20°C (27).

VAPOUR PRESSURE: 100 MM AT 26.1°C (27).

HENRY'S LAW CONSTANT: 0.00555 ATM-M³/MOLE (41).

LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).

CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41) SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Bacteriological

- 220 mL plastic bottle with white seal on cap
- do not rinse bottle, preservative has been added
- avoid touching bottle neck or inside of cap
- fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid (HNO_3)
(Caution: HNO_3 is corrosive)

Volatiles (duplicates) (OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact with sample)
- do not rinse bottle
- fill bottle completely without bubbles

Organics (OWOC), (OWTRI), (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top
- when 'special pesticides' are requested three extra bottles must be filled

Cyanide

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops sodium hydroxide (NaOH)
(Caution: NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) (Caution: HNO_3 & $\text{K}_2\text{Cr}_2\text{O}_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
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Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid (HNO_3)
(Caution: HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap with sample water three times
- fill to 2 cm from top

Bacteriological

- 250 mL plastic bottle with white seal on cap
- do not rinse bottle, preservative has been added
- avoid touching bottle neck or inside of cap
- fill to top of red label as marked

Metals

- 500 mL plastic bottle (PET 500)
- rinse bottle and cap three times
- fill to 2 cm from top
- add 10 drops nitric acid HNO_3
(Caution: HNO_3 is corrosive)

Volatiles (duplicate)
(OPOPUP)

- 45 mL glass vial with septum
(teflon side must be in contact
with sample)
- do not rinse bottle, preservative
has been added
- fill bottle completely without
bubbles

Organics
(OWOC) (OAPAHX)

- 1 L amber glass bottle per scan
- do not rinse bottle
- fill to 2 cm from top

Steps:

1. Record time of day on submission sheet.
2. Let cold water flow for five minutes.
3. Record temperature on submission sheet.
4. Fill all bottles as per instructions.
5. Record chlorine residuals (free, combined and total),
turbidity and pH on submission sheet.